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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/810,912 | 03/26/2004 | Lih-Ping Li | 67,200-1256 | 9403 |

7590 02/16/2007
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| EXAMINER |
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TUROC, DAVID P

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| ART UNIT | PAPER NUMBER |
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1762

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 02/16/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/810,912

Applicant(s)

LI ET AL.

Examiner

David Turocy

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-13, 15, 16, 18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7, 8, 10-12, 15, 16, 18 and 20 is/are rejected.
- 7) ☒ Claim(s) 4, 9 and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/4/2006 has been entered.

Response to Amendment

2. Applicant's amendments filed 11/4/2006, have been fully considered and reviewed by the examiner. The examiner notes that claims 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, and 13 have been amended and that claims 6, 14, 17, and 19 have been cancelled. Currently claims 1-5, 7-13, 15, 16, 18, and 20 are pending in the application.

Response to Arguments

3. Applicant's arguments filed 11/4/2006 have been fully considered but directed to newly added limitations to the claims and will be addressed in the rejection below.

Upon further consideration, the examiner has withdrawn the allowable subject matter of previously filed claims 14- 20, including removing silicon residues using the cleaning process, such a limitation is addressed in the rejection below.

Claim Rejections - 35 USC § 112

4. Claims 1, 5, 10, 15, 16, 18, and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Specifically, Claims 1, 5, and 10 all recite that the seasoning film is one of silicon nitride, silicon carbide, and silicon dioxide and the process for depositing the seasoning films uses precursor gases of silane, dichlorosilane, or trimethylsilane. However, the originally filed specification only disclosed forming only a silicon nitride film from dichlorosilane and ammonia (see paragraphs [0022], [0031], and [0040] of the specification), forming a silicon carbide film only from trimethylsilane and carbon dioxide (see paragraphs [0031] and [0040]), and forming the silicon dioxide from silane and an oxygen containing gas. There is no original disclosure (either explicit, implicit, or inherent) of using the any of the taught precursor gases for forming any of the seasoning films.

Claims 15, 16, 18, and 20 are dependant from claims 1,5, and 10 and fail to cure the deficiencies of the independent claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1762

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 3, 5, 8, 10, 12, 15, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Timmermans et al. (US Patent No. 6,974,781) in view of Inaba et al. (US Patent No. 5,629,043)

Referring to claims 1, 5 and 10, Timmermans discloses forming a silicon nitride seasoning film on the interior surfaces of a process chamber using dichlorosilane and ammonia as the precursor gases at a temperature of 700 °C. (column 4 lines 9-15, column 3 lines 49-64). It discloses that the film thickness should be 50 nm or greater this would encompass 2-10 micrometers. It discloses cleaning the chamber prior to the seasoning layer deposition the cleaning process can comprise a chlorine containing gas ClF_3 , (column 6 lines 14-19), where the etching gas removes silicon residues from the chamber because it completely removes the prior silicon seasoning film with the silicon

Art Unit: 1762

deposited on the surface (Column 3, lines 48-64). It does not disclose that the pressure of the process chamber during the deposition be between 10 and 760 Torr. However, Inaba et al. discloses that when forming a silicon nitride film from dichlorosilane and ammonia it is desirable to have the pressure be between 100 and 300 Torr as this pressure range helps prevent oxidation of the deposited film (abstract). Accordingly it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Timmermans et al. to deposit the silicon nitride film at a pressure between 100 and 300 Torr as suggested by Inaba et al. with an expectation that depositing at these pressures will help prevent oxidation of the film.

Timmermans in view of Inaba et al. does not teach a deposition time for the modified method using the pressures of Inaba et al. While Timmermans teaches a time of 150 min. this time is for the conditions used in its deposition and the deposition process of Inaba et al. accordingly one of ordinary skill would expect the time needed to deposit the film to be different for the different process conditions. It is well known that the deposition time effects the thickness of the deposited film. Therefore the deposition time is a result effective parameter in that it effects the film thickness. It would have been obvious to have adjusted the deposition time to values in the claimed ranges through routine experimentation so as to optimize the thickness of the film, especially in the absence of a showing of a criticality for using values in the claimed ranges.

Timmermans also teaches that the silicon nitride seasoning layer will act to prevent deposition of the process gases onto the chamber walls (column 3 lines 26-64).

Timmermans does not teach a plasma deposition of silicon but rather a thermal deposition of silicon nitride. However there is no active step of depositing a silicon layer by plasma deposition in claim 1 so Timmermans in view of Ibana does not need to deposit that layer.

Referring to claims 3, 8, and 12, Timmermans discloses forming the silicon nitride layer from dichlorosilane and ammonia.

Claims 15, 18, and 20: Timmermans discloses plasma deposition of a silicon layer on the substrate within the chamber (Column 6, lines 64).

6. Claims 2, 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Timmermans et al. in view of Inaba et al. in further view of Rossman et al. (US Patent No. 6,121,161).

Referring to claims 2, 6, 7 and 11, Timmermans et al. in view of Inaba et al. teach all of the features of the claims as discussed above except they do not teach that the seasoning film comprises silicon oxide. Rossman et al. teaches that when applying a seasoning layer of silicon nitride to chamber surfaces it is desirable to first deposit a silicon oxide layer from silane and oxygen as it helps better adhere the silicon nitride layer (column 3 lines 16-32, column 9 lines 37-45).

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Timmermans et al. in view of Inaba et al. in further view of Robertson et al. (European patent No. 1,154,037).

Timmermans et al. in view of Inaba et al. teach all the limitations as discussed above including forming a silicon nitride film on a substrate, however, the reference fails to teach of applying an amorphous film. However, Robertson discloses that the formation of silicon nitride and amorphous silicon are known equivalents and that amorphous silicon is known and suitable for deposition onto a workpiece. Therefore, it would have been obvious to one of ordinary skill in the art to have modified Timmermans et al. in view of Inaba et al. to deposit an amorphous silicon on the workpiece with a reasonable expectation of success. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Allowable Subject Matter

1. Claims 4, 9, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Referring to claim 4, 9 and 13, the prior art neither discloses or deems obvious using a silicon carbide seasoning layer. The prior art teaches the advantages of using a silicon nitride layer and combining that with a silicon oxide layer but it does not teach silicon carbide.

Conclusion

Art Unit: 1762

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David Turocy
AU 1762



TIMOTHY MEKS
SUPERVISORY PATENT EXAMINER